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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/773,800	02/06/2004	Yuan-Heng Fan	021653-003100US	8468

20350 7590 11/23/2005

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EXAMINER	
ZARNEKE, DAVID A	
ART UNIT	**PAPER NUMBER**
2891	

DATE MAILED: 11/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/773,800	FAN, YUAN-HENG	
	Examiner	Art Unit	
	David A. Zarneke	2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 September 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *9/1/05* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The corrected Figure 1 submitted 9/1/05 has been considered and is acceptable.

Response to Arguments

Applicant's arguments filed 9/1/05 have been fully considered but they are not persuasive.

Two arguments were presented. The first was that the protrusions of Oh are not part of the wetting layer, but are a separate layer deposited over the wetting layer. The second argument presented is that Oh teaches the protrusions prevent cracking while the protrusions of the present application serve as an anchor to hold the bump onto the bond pad.

Regarding the first argument, Oh teaches the layer [407] is a UBM layer that may be a wetting layer. As applicant claimed in claim 2, the UBM can contain a wetting layer. Therefore, the protrusions [411] of Oh are a separate wetting layer overlying the UBM wetting layer [407]. The protrusions [407] of Oh can be considered to be the wetting layer of the present invention because the present specification (4, 26+) states that the protrusion forming wetting layer can be made of Ni, Pt, Cu or Mo and Oh teaches that the protrusions [407] can be made of Ni, CU, Pd or Pt (2, [0030]). Since they can be made of similar materials, Oh's protrusion can be considered a wetting layer.

With respect to the second argument, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Merely finding a different advantage to the structure of Oh is not patentable. Oh's structure would inherently also anchor the bump to the pad.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3, 4, 6, 11, 13, 14 and 16 are rejected under 35 U.S.C. 102(e) as being anticipated by Oh et al. (US. Pub. 2004/0134974).

In view of these claims (esp. 1 and 11) Oh et al. discloses an integrated circuit chip comprising, a substrate (Para 28), the substrates comprising a plurality of chip structures, a plurality of bonding pads (Fig, 4a #402) disposed on the substrate, with each of the bonding pads being formed from an aluminum bearing material (Para. 7 & 37). Oh et al. shows a surface region formed as a portion of the contact pad (#402) but bounded by layers #404 and #406 (Fig. 4a). Oh et a1. continues to show an under

bump (#406) metal layer (UBM) making contact (Para. 11) to solder bumps (#405), a wetting layer (Para. 28) containing extensions or protrusions of the wetting layer, disposed spatially, and a bump layer over the wetting layer coupled to the plurality of protrusions (#411).

In view of claims 3 and 13, Oh et al. details each of the protrusions has a predetermined height and a predetermined width (Para. 29).

In viewing claims 4 and 14, Oh et al. depicts each of the protrusions has a predetermined height, the height ranging from about 15 to about 20 microns (Para. 29).

In view of claims 6 and 16, the Oh et al. wetting layer is provided by a deposition (Para. 42) or plating process (Para. 34).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 5,7-9, 15 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oh et al. in view of Farnworth et al. (US Pat. 6,687,989).

In view of claims (esp. clms. 5 and 15), Oh et al. discloses an integrated circuit chip comprising substrates comprising a plurality of chip structures, a plurality of bonding pads disposed on the substrate, an under bump metal layer (UBM) making contact to solder bumps, a wetting layer containing extensions or protrusions. However, Oh et al. fails to consider use of bonding pads of dimensions of about 100 by 100 microns. But, Farnsworth et al. discloses a teaching where the bond pads consist of an area 100 by 100 microns (Col. 4 lines 22-26).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the UBM teachings of Oh et al. with preference for Farnworth et al. in the likelihood of fabricating a device with a number of versatile designs, that some permanent structures of the device must be sized to accommodate a11 the variations.

Oh et al. discovered that differing patterns of the design would be used in making the spaced projections different, and that these different design patterns are ascribed an area which can accommodate a11 possibilities (Col. 4 lines 18-30).

In view of claims 7 and 17, where Farnworth et al. makes a number of protrusions using an electroless process prevents the contact pad or protrusions from softening (Col. b lines 33-45).

In view of claims 8-9 and 18, Farnworth et al. discloses silicon substrate (Col. 1 lines 30-35) or silicon on glass insulator (Col. 2 lines 2-6).

Claims 2 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oh et a1. in view of Yu et al. (US Pat. 6,593,220).

In view of these claims, Oh et al. discloses an integrated circuit chip comprising substrates comprising a plurality of chip structures, a plurality of bonding pads disposed on the substrate, an under bump metal layer (UBM) making contact to solder bumps, a wetting layer containing extensions or protrusions. Yet, Oh et al. fails to suggest that the under bump metal layer comprises, an adhesive, a wetting and a protective material. Yu et al. makes an under bump metal layer comprised of an adhesive material, a passivation material, and a barrier protective material.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the UBM teachings of Oh et al. with those Yu et al. with the prospect of using three layers for the UBM layer with multi-purposes. The quest of Yu et a1. was to find materials that supplied specific purposes in the final formation of the UBM layer, and found that improved adhesion using chromium, diffusion prevention

using copper and gold for protection appeared to be the best combination for the UBM layer (col 8, lines 30-40).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David A. Zarneke whose telephone number is (571)-272-1937. The examiner can normally be reached on M-Th 7:30 AM-6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Baumeister can be reached on (571)-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

David A. Zarneke
Primary Examiner
November 19, 2005